

## BRITISH FISHES

*Natural History of British Fishes: their Structure, Economic Uses, and Capture by Net and Rod. Cultivation of Fish Ponds, Fish suited for Acclimatisation, Artificial Breeding of Salmon.* By Frank Buckland, Inspector of Fisheries. (London: Society for Promoting Christian Knowledge.)

IT would have been difficult for Mr. Buckland to produce a dull book on any question connected with the economy of our fisheries; his merit in this respect has tended, however, to lead him too much in an opposite direction. It is painful, now that we are deprived of the living presence of the genial naturalist and industrious fishery inspector, to write an unkind word regarding any branch of his life's work; but of this book we are compelled to say that we would have appreciated it better had it been less "familiar" and more scientific. That it should be full of interesting information about fishery matters was quite to be expected from the richness of the stores which its author always had at his command, and if Mr. Buckland had taken pains to digest the matter so lavishly extracted from *Land and Water*, and had likewise collated the miscellaneous information contained in the volume with care, he might then have enjoyed the satisfaction of presenting to the public a natural history of British fishes which probably would have compared satisfactorily with other good books of the kind. It is not too much to affirm that a carefully edited selection from the numerous essays contributed to the various blue-books to which the deceased gentleman was so voluminous a contributor, would have made a more interesting volume than the present work. The fact is, Mr. Buckland was nothing if he was not sketchy and rapid; he would not be tied down to severe statements, but preferred to give an off-hand opinion in a dashing way, no matter that he might find out within the year that what he had advanced was very far wrong. In the present volume, as a glance at the plethoric title-page will show, Mr. Buckland attempted too much, with the result that portions of the information conveyed are scrappy, while some of it is probably slightly imaginative: books and articles written in railway trains often enough provide hard work for the reader. In a preface to his work Mr. Buckland takes pains to point out how greatly we are deficient in *exact* knowledge of the habits of our sea-fish, of the times and places of their spawning, of the food they eat, and of the period at which they are able to repeat the story of their birth. Some of the many questions which are asked by Mr. Buckland we are under the impression he should himself have been well able to answer. Whether cods' eggs "sink or swim" has been often discussed, and the author ought to have been able to tell us the truth in that matter; but, on turning to the account given of the cod-fish in the present book (p. 50), it seems to be singularly deficient in its details of the natural history of that animal. So far as we can observe, no reference whatever is made to the theory of Sars with reference to the floating of the eggs, but a few pages relative to the personal adventures of the author are not wanting, whilst the old story of "the Logan fish-pond" is re-told with great circumstantiality. Twenty-five pages of the work are devoted to the salmon (*Salmo salar*),

and the essay, confused as it is, is well worthy of perusal, although it contains, as do other portions of the book, a good deal about Mr. Buckland, and recapitulates, as usual from *Land and Water*, an account of some of the big fish in "my museum." It would be a tedious process to anatomise the contents of this "Natural History of British Fishes"; taking all that is written at its true value, we set down the work as an interesting collection of miscellanea. The account given of the Loch Leven trout (*Salmo Levenenses*) is exceedingly meagre, as is likewise the descriptions of several other fresh-water fishes, notably the vendace of Loch Maben. The most suggestive part of the present work is that which is devoted to "Pisciculture" (pp. 334 to 375). Under the title of "The Cultivation of Fish Ponds," much interesting matter is given, and a good deal of information that must be new to the uninitiated is set forth. But notwithstanding the many pleas for pisciculture which have at various times been advanced, it is questionable if the cultivation of other fresh-water fish than the salmon would pay as a food resource. A larger supply of trout would no doubt be welcome to the angler, because the trout is the fish of the angler *par excellence*; moreover in many places angling has now to be paid for, and lairds in Scotland who let their moors and lochs can always lease them to greater advantage when they are well stocked.

## OUR BOOK SHELF

*Proceedings of the Aberdeenshire Agricultural Association.* (Fourth Annual Report, 1879-80.)

WE have here an account of the field and laboratory experiments carried out by Mr. Jamieson for the Aberdeenshire Association during the year 1879. The crops experimented on were turnips and oats. As before, the principal object in view was to ascertain the comparative manuring value of various phosphates in different states of aggregation. We can glance at only a few points in the results.

Mr. Jamieson claims to have shown that a finely powdered mineral phosphate, as, for instance, powdered coprolite, is nearly equal as a manure for turnips to the same amount of phosphate applied in a soluble form as a superphosphate, while the simply powdered phosphate is of course much cheaper than the manufactured manure. There is probably no doubt that on some soils a finely powdered mineral phosphate is sufficiently soluble to produce a considerable effect on the crop, if only the phosphate is applied in sufficient quantity, so as to present a considerable surface for attack; and to Mr. Jamieson belongs the credit of giving prominence to this fact, though it was by no means unknown before his experiments. There is however no reason for supposing that dissolved and undissolved phosphates have the same manurial value. When large doses of each are applied the manures may appear of equal value, because while the undissolved phosphate is sufficient for the wants of the crop, the dissolved phosphate is in excess of all requirements, and is therefore wastefully employed. Mr. Jamieson applies 100 lbs.<sup>1</sup> of phosphoric acid per acre both as dissolved and undissolved phosphate; that is to say, about 3 cwts. of bone ash and 5 cwts. of bone-ash superphosphate. Such a comparison is probably quite unfair to the soluble phosphate. For the small turnip crops obtained in Mr. Jamieson's experiments 2½ cwts. of

<sup>1</sup> On page 15 of the appendix the amount of phosphoric acid applied per acre is stated to be 100 lbs., but on page 16 the quantity is given as 200 lbs.

superphosphate drilled with the seed would be found quite sufficient, and probably fully equal in effect to twice the quantity of phosphoric acid applied as powdered coprolite.

Phosphate of iron applied alone was found to have practically no effect on the turnip crop, and the effect of phosphate of aluminium was but little; this is pretty much as we should expect. There is apparently some mistake in the printed analysis of the phosphate of aluminium used, as it is made to contain 38.28 per cent. of lime, and only 4.76 per cent. of ferric oxide and alumina.

The analyses given of the turnip soils cannot pass without a word; the reporter is surely unaware of the absurdity which these analyses present. The soil of the unmanured plot in the five experimental fields was analysed in 1876, and again in 1879, after three turnip crops had been taken. The analyses show that on an average about 20 per cent. of the nitrogen, and about 48 per cent. of the phosphoric acid in the soil had been removed during these three years, and yet the total weight of the three turnip crops grown on the five fields during this period averaged but 16 tons per acre! The only remark made by the reporter on these figures is that the soil has evidently become reduced in nitrogen, and much reduced in phosphates; the fact that either the soil sampling or the analyses must be utterly wrong seems to have altogether escaped his attention.

The experiments with oats do not call for any special remark, except to note the patience which shelled 136,000 grains by hand in order to determine the proportion of kernel to husk in the produce of the various plots.

May we suggest that in a report of field experiments the dates of sowing and of harvest should always be given, and also a description of the character of the weather during the growing period. Without such facts before us it is impossible to interpret the results of field experiments.

*Proceedings of the London Mathematical Society.* Vol. xi. (November, 1879, to November, 1880).

THIS is a smaller volume than usual, there being fewer papers, and none of them of a great length. The pure mathematics prevails somewhat more than usual over the mixed.

Prof. Cayley contributes articles "On the Binomial Equation  $x^2 - 1 = 0$ ; Trisection and Quartisection," a theorem in spherical trigonometry, on a formula of elimination. Sir James Cockle writes "On a Binomial Biordinal and the Constants of its Complete Solution." Mr. J. W. L. Glaisher, "On a Method of obtaining the  $q$ -formula for the Sine-amplitude in Elliptic Functions"; Mr. H. W. Lloyd Tanner, "Notes on a General Method of Solving Partial Differential Equations of the First Order with several Dependent Variables," and a preliminary note on a generalisation of Pfaff's Theorem; Mr. J. J. Walker, "Theorems in the Calculus of Operations"; and Mr. T. R. Terry, "Notes on a Class of Definite Integrals." Papers of a geometrical nature are—Mr. J. Griffiths, on a geometrical form of Landen's theorem with regard to a hyperbolic arc, and on a class of closed curves whose arcs possess the same property as two Fagnanian arcs of an ellipse; Mr. H. Hart, on the focal conics of a bicircular quartic; Mr. H. M. Taylor, on the equation of two planes which can be drawn through two given points to touch a quartic; Rev. J. Wolstenholme, a form of the equation determining the form and directions of a conic whose equation in Cartesian co-ordinates is given. Dr. Klein of Leipsic has a short note on the transformation of elliptical functions; Mr. Greenhill applies elliptic co-ordinates and Lagrange's equations of motion to Euler's problem of two centres of force; and Mr. Routh writes on functions analogous to Laplace's functions. Lord Rayleigh's papers are on reflection of vibrations at the confines of

two media between which the transition is gradual, and on the stability or instability of certain fluid motions. Mr. Samuel Roberts has two notes: one on a problem of Fibonacci's, and the other on the integral solution of  $x^2 - 2Py^2 = -z^2$  or  $\pm 2z^2$  in certain cases; Mr. R. F. Scott writes on cubic determinants and other determinants of higher class, and on determinants of alternate numbers (a treatment which he has adopted in his work on "Determinants"). Mr. Hugh McColl contributes a fourth paper on the calculus of equivalent statements (cf. Prof. Jevons's remarks, NATURE, vol. xxiii. p. 485). Other minor articles conclude the volume.

## LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

## The New Museum of Natural History

THE new Natural History Museum, opened on Easter Monday, was visited by some 16,000 people of a most orderly and respectable class. Owing to the great exertions of Dr. Woodward, whose zeal is beyond praise, the main gallery, the Pavilion, and the Gallery of Reptiles were shown in a practically completed state. The Mineral Gallery has long been ready, but the arrangement of the botanical section is still incomplete, and it was entirely closed. Some little trouble was caused with the umbrellas, and it might be worth while to consider whether, except perhaps in wet weather, the umbrellas need be taken away. The idea that people poke with sticks at objects in museums has been long exploded, and no inconvenience is felt at the Kensington Museum, the Louvre, and nearly all foreign galleries and exhibitions, where umbrellas are admitted.

The architecture in the Mammalia Gallery is very obtrusive, and its over-ornate character and the variety of tone of the terra-cotta, and the similarity of this in colour to the skulls and skeletons of the fossil mammalia, are most unfortunate.

It seems a pity that some style with more repose than "Decorated Norman" was not selected. Although very beautiful as a building, and with many features deserving high praise from an architectural point of view, it is evidently not the style best adapted to set off natural-history specimens. The cathedral-like Index Museum, with its rather dark side-chapels, and the Museum of British Zoology are of proportions that will render it difficult to make an effective display in them.

I hope that it is not finally decided to place the recent mammalia on the first floor and the birds on the ground floor, because the architect's string courses would be interfered with otherwise by the cases. The living and extinct mammalia should face each other, and the birds go aloft. Convenience has already been too much sacrificed to architecture. Every time the first floor is visited the length of the Index Museum, 150 feet, must be traversed to reach the stairs, and the same distance back along the corridor to reach the door of the Mineral Gallery. This means an immense waste of time. I also notice that the crane is close to the main entrance, and that there are no proper lifts.

If it was necessary to fashion all the ornaments from natural-history objects, it is a pity that the restorations were not accurately made. The oft-repeated figure of a Dapedius swallowing a fish almost its own size, and of spiral shells bent to accommodate them to the mouldings of an arch, is not instructive. The humour of ornamenting (?) the arch leading into the pavilion with a hideously-represented Archæopteryx in high relief, repeated a dozen times, is not obvious, but some joke must doubtless be intended.

The cost of the small bronze and glass conservatories in the botanical department is out of all proportion to the objects they are to contain. Dried stems of tree-ferns and palms, though very interesting in their way, do very well in other museums without glass cases, and can be replenished for next to nothing.

F. G. S.